

Abstract of the Disclosure

A urethane based polymer composition is provided that exhibits superior shielding properties during and after exposure to high level radiation. The composite is formed by mixing a liquid isocyanate monomer, preferably 4,4'-diisocyanate monomer with a liquid phenolic resin, preferably phenol formaldehyde resin, and a phosphate ester flame retardant. An optional pyridine catalyst may be added to shorten the cure time. The resulting composition cures at room temperature and can be utilized in several manners, including spraying or pouring the composition prior to curing over radioactive material to prevent leakage of radiation. The uncured composite can be sprayed on the walls of a room or container to prevent leakage of radiation and can also be used to contain radiation prior to demolition. The uncured composite can also be molded into bricks or panels for use in construction. In a preferred embodiment, the polymer composition further incorporates radioactive waste, namely depleted uranium oxide, and can be used in conjunction with specially designed containers for storing radioactive material. The resulting polymer/waste composition cures at room temperature and does not deteriorate or suffer structural damage when exposed to higher levels of gamma radiation, nor do the mechanical or chemical properties undergo any detectable change. The composition is resistant to biodegradation and combustion, and does not creep or shrink during thermal cycling.